STATEMENT OF WORK FOR CONDUCTING A REMEDIAL INVESTIGATION AND FEASIBILITY STUDY AT THE Himco, Inc. Dump Elkhart, Indiana

This document constitutes the Statement of Work (SOW) to conduct a Remedial Investigation and Feasibility Study (RI/FS) at the Himco, Inc. Dump site in Elkhart, Indiana. The purpose of a SOW document is to provide the direction and intent of the RI/FS. An RI/FS Workplan will be developed which will provide more detailed guidance on the execution of the RI/FS.
The purpose of the RI is to determine the nature and extent of contamination at the Himco, Inc. Dump site. The purpose of the FS is to develop and evaluate appropriate remedial action alternatives based on the RI data and report. All personnel, materials, and services required to perform the RI/FS will be provided by the contractor.

This SOW generally addresses items needed to fulfill the requirements for an RI/FS. The RI/FS Work Plan to be developed pursuant to the SOW will present a phased approach that recognizes the interdependence of the RI and FS. The data collected in the RI influence the development of remedial alternatives in the FS, which in turn affects the data needs and scope of treatability studies and additional field investigations. U.S. EPA's March 1988 "Draft Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA" should be utilized in the preparation of the Work Plan and the execution of the RI/FS.

In the following sections, brief discussions of the major RI/FS tasks are presented, by three major topical categories:

*Plans and Management;
*Remedial Investigation (RI); and
*Feasibility Study (FS).

PLANS AND MANAGEMENT

TASK 0 - WORK PLAN PREPARATION

An RI/FS Work Plan (WP) will be prepared for the Himco, Inc. Dump site that details the technical approach, personnel requirements, and schedule for each task described in this SOW. The schedule will show the implementation of tasks and submission of deliverables in weeks subsequent to approval and acceptance of prior deliverables. Incorporated into the WP will be several specific plans addressing sampling, quality assurance / quality control (QA/QC), health and safety. These specific plans are as follow:

Sampling Plan

A Sampling Plan (SP) that addresses all data acquisition activities will be prepared. The plan will contain a statement of sampling objectives, specification of equipment, required analyses, sample types, sample locations, and frequency. The plan will address specific hydrologic, hydrogeologic, and air transport characterization methods including, but not limited to, geologic mapping, geophysics, field screening, drilling and well installation, ground water flow determination, and sampling. The application of these methods will be described for each major subtask within the site investigation (e.g., waste characterization, migration pathway assessment, and contaminant characterization). The plan will also identify the data requirements of specific remedial technologies which may be necessary to evaluate remedial alternatives in the FS. The Compendium of Superfund Field Operations Method (EPA/540/P-87/001a, OSWER Directive 9355.0-14, Sept. 1987) will be utilized in the selection and definition of field methods, sampling procedures, and custody.

Quality Assurance Project Plan

A QAPP, prepared in accordance with current U.S. EPA guidance, will be appended to the SP. The purpose of the QAPP is to ensure that formal procedures are available for all activities affecting the quality of data collected. A PreQAPP meeting will be arranged to ensure that the QAPP is prepared properly.

The QAPP will be prepared according to U.S. EPA guidance documents, and will include the following 16 elements:

1. Title page with provisions for approval signatures;
2. Table of contents;
3. Project description;
4. Project organization and responsibility;
5. QA objectives for measurement data in terms of precision, accuracy, completeness, representativeness and comparability (for each parameter);
6. Sampling procedures;
7. Chain of custody procedures;
8. Calibration procedures and frequency;
9. Analytical procedures;
10. Data reduction, validation and reporting;
11. Internal quality control checks;
12. Performance and system audits and frequency;
13. Preventive maintenance procedures and schedules;
14. Specific routine procedures to be used to assess data precision, accuracy, and completeness of specific measurement parameters involved;
15. Corrective action;
16. Quality assurance reports to management.

Health and Safety Plan

A Health and Safety Plan (HSP) will be prepared to address hazards that investigation activities may present to the investigation team and to the surrounding community. The HSP will conform to applicable regulatory requirements and guidance, including the U.S. EPA Standard Operating Safety Guides, and will detail personnel responsibilities, protective equipment, procedures and protocols, decontamination, and training and medical surveillance as required under 29 CFR 1910.120. The plan will identify problems or hazards that may be encountered and their solutions. Procedures for protecting third parties, such as visitors or the surrounding community, will also be provided.

Endangerment Assessment Plan

An Endangerment Assessment Plan will be developed for identifying the baseline risks posed by the Site under the no action alternative. The methodology presented in this plan will conform to the Superfund Public Health Evaluation Manual (updated 10/87) and the Superfund Exposure Assessment Manual (9/87).

Data Management Plan

A Data Management Plan will be developed to document and track investigation data and results. The plan will identify and establish laboratory and data documentation materials and procedures, project file requirements, and project-related progress reporting procedures and documents.

ATSDR Health Assessment

The WP for the site shall also provide for collection of adequate information to support an ATSDR Health Assessment which is required by SARA. Since the health assessment will be prepared by ATSDR, all draft Work Plans and support documents will be submitted for ATSDR review and comment (by the U.S. EPA RPM) to ensure that their needs and requirements are being met. In the event that the health assessment has already been completed by the ATSDR,the report will include and address the findings of that report.

The preparation of the project plans will be preceded by an evaluation of the existing information and initiation of investigative support activities (Task 1).

Specifically, the RI/FS WP will be developed and implemented in conformance with all provisions of this SOW, and the standards set forth in the following statutes, regulations, and guidance:

*Section 121 of CERCLA as amended by SARA;

*U.S. EPA March 1988 Guidance on Conducing Remedial Investigations and Feasibility Studies under CERCLA;

*National Contingency Plan, dated November 1985, as amended;

*Additional guidance documents provided by the U.S. EPA.

REMEDIAL INVESTIGATION

Objectives and Scope

The objectives of the RI are to:

*Characterize the source(s) of potential contamination;

*Characterize the hydrogeologic and physical setting to determine the most likely contaminant migration pathways and physical features that could effect potential remedial actions;

*Determine the migration rates, extent, and characteristics of contamination that may be present at the site;

*Gather data and information to the extent necessary and sufficient to quantify risk to public health and the environment and to support the development and evaluation of viable remedial alternatives in the FS.

The remedial investigation consists of five tasks:

Task 1: Description of Current Situation and Investigative Support
Task 2: Site Investigation
Task 3: Site Investigation Analysis
Task 4: Bench/Pilot Testing Studies
Task 5: Reports

A description of each of these tasks is presented in the following section.

TASK 1 - INVESTIGATIVE SUPPORT AND DESCRIPTION OF CURRENT SITUATION

Site Mapping

An accurate topographic map of appropriate working scale and contour interval will be prepared. A base map of the site will be prepared from this topographic map, and will have a scale of one inch to 100 feet (1":100') and two foot contour intervals. The base map will illustrate the locations of wetlands, floodplains, water features, drainage patterns, tanks, buildings utilities, paved areas, easements, right-of-ways, and other pertinent features. Larger scale maps will be produced from the base mapping, as necessary.

Surveying will be required to establish horizontal and vertical controls for the site relative to the National Geodetic Vertical Datum of 1929. In addition to the topographic map, a grid plan will be prepared using the base map and grid overlay at a nominal scale of the map. This grid plan will show the location of existing monitoring wells, additional wells installed, all sampling locations, and water supply wells.

A legal description of the property will be reviewed and field checked. The intent is not to perform a boundary survey, but to locate the boundaries so that future activities do not carry over onto adjacent properties without proper permission.

Township and Range

A legal description of the site will be assembled from existing county and township records and the results of the site survey.

Access Arrangements

The Parties will obtain an executed access agreement to enter the site. Further arrangements may include negotiating access agreements for construction of access roads or other activities related to the RI/FS.

Preparation of Support Facilities

Arrangements will be made to construct the appropriate support facilities and/or procure the equipment necessary to perform a hazardous site investigation. This includes preparation of decontamination facilities, utility hook-ups, and site access control stations.

Description of Current Situation

The background information pertinent to the site and to environmental concerns will be described, and the purpose of the RI will be further detailed. The data gathered during previous investigations will be reviewed and evaluated. Regional information will be obtained from available USGS and Indiana Geological Survey reports. The existing site information that will be reviewed may include but will not necessarily be limited to:

*IDEM and U.S. EPA files;
*Elkhart County Soils Conservation Service reports;
*Aerial photographs;
*Historical water quality data;
*U.S. and Indiana Geological Survey files;
*Disposal records (if available).

In addition to this literature search, on-site activities may be used to confirm and/or update certain information. For example, existing monitor wells may be inspected to determine if they are functional. Also, the location and status of selected water supply wells may be field verified.

Information and data that are gathered during these initial steps will be used to generate a preliminary Site Evaluation Report which will address the following:

Site Background

A summary of pertinent boundary conditions, general site physiography, hydrology, and geology will be prepared. A complete site history as it pertains to waste disposal activities and ownership transfer will also be prepared.

Nature and Extent of the Problem

A summary of actual and/or potential on-site and off-site health and environmental effects will be prepared. Threats or potential threats to public health and the environment will be emphasized.

History of Response Actions

A history of response actions conducted by local, state, or private parties will be prepared.

Definition of Boundary Conditions

Site boundary conditions will be established to limit the area of investigation. The boundaries will be set so that the on-site activities will cover the contaminated media in sufficient detail to support the FS. Boundaries for site access control and site boundary security will also be identified. The boundaries of the study area may or may not correspond to the property boundaries.

Identification of Potential Receptors

Potential receptors, human and environmental, will be identified and used in the development of the site conceptual model, migration pathway assessment, and endangerment assessment. Included will be the identification of private and public water supply wells within a 2-mile radius of the site. If possible, well construction details for these wells and other private water supply wells, which may have been previously sampled will be obtained. A table summarizing the known construction details will be prepared and submitted with the original drilling logs, as available.

Develop Site Conceptual Model

Information on the waste sources, pathways, and receptors at the site will be used to develop a conceptual site model to evaluate potential risks to human health and the environment. The conceptual site model will include all known and suspected sources of contamination, types of contaminants and affected media, known and potential routes of migration, and all known or potential human and environmental receptors. If exact data are unavailable for components of the model, the likely variability in the component will be identified so that the model identifies the possible range of contaminant migration and the potential effects on receptors. This effort, in addition

to assisting in identifying where samples need to be taken, will also assist in identifying appropriate remedial technologies.

The Investigative Support and Description of Current Situation (Task 1) will be conducted prior to, or concurrent with, the Work Plan Preparation (Task 0). The Preliminary Site Evaluation Report, consisting of activities completed in Task 1, will be submitted as supporting documentation with the Work Plan.

TASK 2 - SITE INVESTIGATION

Investigations necessary to characterize the site and its actual or potential hazard to public health and the environment will be conducted. The investigations will result in data of adequate technical content to support the development and evaluation of remedial alternatives during the FS. Investigation activities will focus on problem definition and data to support the screening of remedial technologies, alternative development and screening, and detailed evaluation of alternatives.

The site investigation activities will follow the Plans set forth in Task 0. Sample analyses will be conducted at laboratories following EPA protocols or their equivalents. Strict chain-of-custody procedures will be followed, and all samples will be located on the site map (and grid system) established under Tasks 0 and 1. A description of the types of investigations that will be conducted is presented below.

Source Characterization

An investigation will be carried out to characterize the physical and chemical aspects of the waste materials and the materials in which they are contained. The investigation of these source areas will involve obtaining data related to:

*Waste characteristics (type, quantity, chemical and physical properties, and concentrations); and

*Facility characteristics (type and integrity of containment, leachate collection systems, and drainage control).

It is anticipated that this information will be obtained from a combination of existing site information, field inspections, and site sampling activities.

The source characterization will culminate in the preparation and submittal of a technical memorandum. This memorandum will summarize the findings of the source characterization and will recommend parameters, or classes of parameters, which will be the focus of subsequent contaminant characterization studies.

Migration Pathway Assessment

The migration pathways at the Himco, Inc. Dump site will be characterized through the following types of investigations:

Hydrogeologic

A hydrogeologic study will be performed to further evaluate the subsurface geology and characteristics of the water bearing formations. This study will define the site hydrostratigraphy, controlling geologic features, zones of preferential ground water transmission, and the distribution of hydraulic heads within the water bearing formations. The results of this study will be combined with the existing site data described in the preliminary site evaluation report and the results of the source characterization to define the ground water flow patterns and to examine the vertical and lateral extent of contaminant migration. These data will form the rationale for locating and designing monitoring wells and the subsequent contaminant characterization.

Hydrologic

Drainage patterns and runoff characteristics will be evaluated for the potential of erosional transport. Surface water features such as streams, ponds, and lakes will also be evaluated. Staff gauges may also be used to evaluate the potential of hydraulic connection between surface water bodies and the ground water flow system, and to determine the potential for sediment transport.

Soils and Sediment

The physical characteristics of the site soils and aquatic sediments will be evaluated. Some elements of this investigation may overlap with the above described investigations.

Air

The potential for airborne particle and vapor transport will be evaluated to determine if an atmospheric testing program (over and above that required for assuring the personal protection of the site workers and surrounding community) should be initiated at later project stages. Meteorological data may be required to characterize the atmospheric transport.

Human Populations

Information will be collected to identify, enumerate, and characterize human populations potentially exposed to contaminants released from the site. For a potentially exposed population, information will be collected on population size and location. Special consideration should be given to identifying potentially sensitive subpopulations such as children, pregnant women, infants, and the chronically ill. The identification of these high-risk subpopulations should be linked with the potential contaminants of concern (i.e., those that are mutagenic, teratogenic, etc.) to identify how these populations may be at risk. Census and other survey data may be used to

identify and describe the population exposed to various contaminated media. Information may also be available from USGS maps, land use plans, zoning maps, and regional planning authorities.

Ecological Investigations

Biological and ecological information will be collected for use in the risk assessment. It will aid in the evaluation of impacts to the environment associated with this site and also help to identify potential effects with regard to the implementation of remedial actions. The information will include a general identification of flora and fauna in and around the site (including endangered and threatened species and those consumed by humans or found in human food chains) and identification of critical habitats. Bioassay information may be needed for species that are known to be consumed by humans. Chapter 12 of A Compendium of Superfund Field Operations Methods and Table 1 provide a summary of both environmental information that may be needed and potential collection methods. The Natural Resources Trustee for the site will be contacted (by U.S. EPA RPM) to determine if other ecological data are available that may be relevant to the investigation.

It is anticipated that this information will be derived form a combination of existing data information, and data resulting from the field investigations.

Contaminant Characterization

Data generated from the Pathway Assessments and Source Characterization will be used to design an environmental sampling and analysis program. The objective of this program is to evaluate the extent and magnitude of contaminant migration along the pathways of concern in the five media of ground water, surface water soil, sediments, and air at the Himco, Inc. Dump site.

Monitoring points will be installed in each appropriate media previously identified as a migration pathway. This monitoring network may incorporate several of the piezometers and/or staff gauges installed during the Pathway Assessment.

The analytical parameters list used in this subtask will be based on the data collected during the source characterization and review of background information. The selection of parameters or classes of parameters (i.e., volatile organics, metals, etc.) will be based upon their source concentration and their persistence and mobility within the most likely pathway of migration. Provisions will be made for conducting full U.S. EPA Contract Lab Program Target Compound List (TCL) analyses at those monitoring stations where there is a reasonable anticipation of detecting a complex contaminant profile. Samples will be collected, handled, and analyzed in accordance with the protocols and procedures described in the site SP and QAPP. An addendum to the SP and QAPP may be required for this additional sample collection and analyses.

Provisions will be made for conducting additional site investigation activities after completion of Task 7: Screening of Alternatives. Task 8 outlines these supplemental investigations which are intended to further

characterize the sources, pathways, and/or contaminants and to satisfy the specific data requirements of the applicable remedial actions. The Plans for these investigations and the bench/pilot studies will be prepared and submitted for U.S. EPA comment and approval.

TASK 3 - SITE INVESTIGATION ANALYSES

An analysis of data collected during this investigation will be made to assure that the quality (e.g., QA/QC procedures have been followed) and quantity of data adequately support the Endangerment Assessment and FS.

Endangerment Assessment

A Contaminant Pathway and Transport Evaluation and Endangerment Assessment will be prepared describing the specific chemicals at the Himco, Inc. Dump site and ambient levels at the site; the number and location and types of nearby populations; activities and pathways that may result in an actual or potential threat to public health, welfare, or the environment; and a projection of chemical concentrations at the different points of exposure through each media pathway over the likely period of exposure.

This assessment will be conducted in accordance with the procedures described in the Superfund Public Health Evaluation Manual, (updated 10/87), and the Superfund Exposure Assessment Manual, (9/87).

TASK 4- BENCH/PILOT TESTING STUDIES

If necessary, bench and pilot scale testing studies will be performed to determine the applicability of selected remedial technologies to site specific conditions. These may include treatability and cover studies, aquifer testing, and/or material compatibility testing. These studies will be conducted in the later stages of the RI after the initial screening of the remedial technologies (Task 7). If required, supplements to the appropriate plans (i.e., SP, QAPP) will be prepared and submitted to the U.S. EPA for review and approval prior to initiation of this task.

TASK 5 - REPORTS

Progress Reports

Monthly progress reports will be prepared to describe the technical progress of the RI/FS. These reports shall be submitted to the U.S. EPA. The monthly progress reports shall include the following information:

* Progress made this reporting period;
* Problems resolved;
* Anticipated problems and recommended solution;
* Deliverables submitted;
* Upcoming events / activities planned;
* Key personnel changes;
* Subcontracting;
* Percent Complete;
* Schedule;

Technical Memoranda

The results of specific remedial investigation activities will be submit to the U.S. EPA and IDEM throughout the RI/FS process. These memoranda be submitted in draft form and revised upon receipt of U.S. EPA comments The specific technical memoranda include:

* A Site Evaluation Report;

* a Source Technical Memorandum;

* a Techncial Memorandum convering the Site Investigations and Analyses;

* a Hydrogeologic Assessment to discuss groundwater flow and contamination;

* an Endangerment Assessment.

Remedial Investigation Report

A final report covering the investigations will be completed once approva of the Technical Memoranda has been given by U.S. EPA. The suggested for for the RI Report is given in Table 2. The report will characterize the s and summarize data collected and conclusions drawn from the preceding tas The report will be submitted in draft form for review and comment. Techni memorandums prepared previously will be summarized and referenced in orde limit the size of the report. However, the report will completely docume the RI. Upon receipt of comments, a draft final report will be prepared a submitted. The RI report will not be considered final until a letter of approval is issued by the U.S. EPA Remedial Project Manager. A meeting ma be scheduled by the U.S. EPA RPM to discuss EPA and IDEM comments on the draft RI report.

FEASIBILITY STUDY

Scope

The purpose of the FS for the Himco, Inc. Dump site is to develop and evaluate remedial alternatives that protect human health and the environmen and present the relevant information needed to allow for the selection of a site remedy which will be protective of human health and the environment.

The FS will conform to Section 121 if CERCLA as amended by SARA; the NCP, a

amended; and the FS Guidance, as amended. The FS is comprised of the following tasks:

Task 6: Development of Remedial Action Alternatives
Task 7: Screening of Alternatives
Task 8: Treatability and Supplemental Remedial Investigations
Task 9: Detailed Analysis of Alternatives
Task 10: Feasibility Study Report

The intent and purpose of each of these tasks is outlined in the following sections. The technical approach and schedule for each of these tasks will be detailed in the RI/FS Work Plan.

TASK 6 - DEVELOPMENT OF REMEDIAL ALTERNATIVES

This task may be viewed as consisting of steps that involve making successively more specific definitions of potential remedial activities. These steps are described as follow:

Subtask 6A: Develop Remedial Action Objectives

Site-specific objectives for remedial action will be established for the Peerless Plating Company site considering the description of the current situation, information gathered during the RI, Section 300.68 of the NCP, U.S. EPA interim guidance, and the requirements of other applicable U.S. EPA, Federal, and Indiana environmental standards, guidance, and advisories.

These objectives consist of medium-specific or operable unit-specific goals for protecting human health and the environment. They will specify: the contaminant(s) of concern; exposure route(s) and receptor(s); and an acceptable contaminant level or range of levels for each exposure route.

Acceptable exposure levels for human health will be determined on the basis of risk factors and contaminant-specific ARARS. Contaminant levels in each media will be compared with these acceptable levels, which will be determined on the basis of an evaluation of the following factors:

*For carcinogens, whether the chemical-specific ARARS provides protection within the risk range of 10 -4 to 10 -7 and whether achievement of each chemical-specific ARAR will sufficiently reduce the total risk from exposure to multiple chemicals.

*For non-carcinogens, whether the chemical-specific ARAR is sufficiently protective if multiple chemicals are present at the site.

*Whether environmental effects (in addition to human health effects) are adequately addressed by the ARARS.

*Whether the ARARS adequately address all significant pathways of human exposure identified in the baseline risk assessment. For example, if exposure from the ingestion of fish and drinking water are both significant pathways of exposure, application of an ARAR that is based

only on drinking water ingestion (e.g., MCLs) may not be adequately protective.

If an ARAR is determined to be protective, it will be used to establish the acceptable exposure level. If not (presents a risk greater than 10 -4), or doesn't exist for the specific chemical or pathway of concern, or multiple contaminants may be posing a cumulative risk, acceptable exposure levels will be identified through the risk assessment process. Reference to the SPHEM for additional details.

Subtask 6B - Develop General Response Actions

General response actions describing those actions that will satisfy the remedial action objectives will be developed. These may include treatment, excavation, containment, extraction, disposal, institutional actions, or a combination of these.

Subtask 6C - Identify Volumes or Areas of Media

In this subtask, an initial determination is made of areas or volumes of media to which general response actions might be applied. This will be done for each medium of interest at the Himco, Inc. Dump site.

Subtask 6D - Identify and Screen Remedial Technologies and Process Options

In this subtask, the universe of potentially applicable technology types and process options is reduced by evaluating the options with respect to technical implementability. "Technology types" refer to general categories of technologies, such as chemical treatment, thermal destruction, solidification, capping or dewatering. "Technology process options" refer to specific processes within each technology type. Several broad technology types may be identified for each general response action, and numerous technology process options may exist in each technology type. This screening is accomplished by using readily available information from the RI to screen out technologies and process options that cannot be effectively implemented.

Subtask 6E - Evaluate Process Options

In this subtask, the technology processes considered to be implementable are evaluated in greater detail before selecting one or two processes to represent each technology type. One, or in some cases, two, representative processes are selected, if possible, for each technology type to simplify the subsequent development and evaluation of alternatives without limiting flexibility during remedial design. Process options are evaluated using effectiveness, implementability, and cost criteria. These criteria are applied only to technologies and the general response actions they are intended to satisfy - not to the site as a whole. Also, the evaluation will typically focus on the effectiveness factor.

Subtask 6F - Assemble Alternatives

Alternatives are assembled using a combination of general response actions and the process options chosen to represent the various technology types for each media or operable unit, for the site as a whole. General response actions may be combined to form a range of sitewide alternatives. Alternatives to be developed will include at least the following:

a. Treatment alternatives for source control that eliminate or minimize need for long-term management (including monitoring).
b. Alternatives involving treatment as a principal element to reduce the toxicity, mobility or volume of waste.

c. An alternative that involves containment of waste with little or no treatment but provides protection of human health and the environment primarily by preventing exposure or reducing the mobility of the waste.

d. A no action alternative.

Alternatives Array Document

To obtain ARARS from the IDEM, a detailed description of alternatives (including the extent of remediation, contaminant levels to be addressed, and method of treatment) will be prepared. This document will also include a brief site history and background, a site characterization that indicates the contaminants of concern, migration pathways, receptors, and other pertinent site information. A copy of this Alternative Array Document will be submitted to the U.S. EPA along with the request for a notification of the standards. If needed, a meeting will be scheduled between the U.S. EPA, IDEM, and the contractor to discuss the Alternatives Array document and ARARS.

TASK 7 - SCREENING OF ALTERNATIVES

This task will narrow the list of potential alternatives that will be evaluated in detail and is comprised of the following steps:

*The alternatives are further refined as appropriate;

*they are evaluated on a general basis to determine their effectiveness, implementability, and cost;

*a decision is made, based on this evaluation, as to which alternatives should be retained for further analysis.

Subtask 7A - Alternatives Definition

In this subtask, alternatives will be further defined to form a basis for evaluating and comparing them prior to their screening. Sufficient quantitative information to allow differentiation among alternatives with respect to effectiveness, implementability, and cost is required. Parameters that require additional refinement include the extent or volume

of contaminated material and the size of major technology and process options. The following information should be developed, as appropriate, for the various technology processes used in an alternative:

*size and configuration of onsite extraction and treatment systems or containment structures;

*time frame in which treatment, containment, or removal goals can be achieved;

*rates or flows of treatment;

*spatial requirements for constructing treatment or containment technologies or for staging construction materials or excavated soil or waste;

*distances for disposal technologies;

*required permits and imposed limitations.

Subtask 7B - Screening Evaluation

In this subtask, defined alternatives are evaluated against short- and long-term aspects of three broad criteria: effectiveness, implementability, and cost. These are described as follow:

*Effectiveness: Alternatives will evaluated to determine whether they adequately protect human health and the environment; attain Federal and Michigan ARARS or other applicable criteria, advisories, or guidance; significantly and permanently reduce the toxicity, mobility, or volume of the hazardous constituents; are technically reliable; and are effective in other respects. The consideration of reliability will include the potential for failure and the need to replace the remedy.

*Implementability: Alternatives will be evaluated as to the technical feasibility and availability of the technologies that each alternative would employ; the technical and institutional ability to monitor, maintain, and replace technologies over time; and the administrative feasibility of implementing the alternative.

*Cost: The cost of construction and long-term costs to operate and maintain the alternative will be evaluated. This evaluation will be based on conceptual costing information and not a detailed cost analysis. At this stage of the FS, cost will be used as a factor when comparing alternatives that provide similar results, but will not be a consideration at the screening stage when comparing treatment and non-treatment alternatives.

Subtask 7C - Alternative Screening

In this subtask, alternatives with the most favorable composite evaluation of all factors are retained for further consideration during detailed analysis. Alternatives selected will preserve the range of treatment and containment technologies initially developed plus the no action alternative.

A technical memorandum will be prepared and submitted to the U.S. EPA detailing the development and initial screening of remedial alternatives (Tasks #6 and #7). A meeting will also be scheduled between the contractor, the U.S. EPA, and the IDEM to discuss (1) the set of alternatives selected for detailed analysis, and (2) the need for treatability and supplemental remedial investigations and what form they would take.

TASK 8 - TREATABILITY AND SUPPLEMENTAL REMEDIAL INVESTIGATIONS

Data requirements not already available through the Remedial Investigation that are specific to the remedial alternatives identified for detailed analysis in Task 9 will be identified. These additional data needs may involve the collection of site characterization data, supplemental remedial investigations, or treatability studies to better evaluate technology performance.

Subtask 8A - Determination of Data Requirements

Additional data needs can be identified by conducting a more exhaustive literature survey than was originally conducted when potential technologies were initially being identified. The objectives of a literature survey are as follow:

*Determine whether the performance of those technologies under consideration have been sufficiently documented on similar wastes considering the scale and the number of times the technologies have been used.
*Gather information on relative costs, applicability, removal efficiencies, O&M requirements, and implementability of the candidate technologies.

*Determine testing requirements for bench or pilot studies, if required.

Subtask 8B - Treatability Testing

Treatability testing performed during an RI/FS is used to adequately evaluate a specific technology, including evaluating performance, determining process sizing, and estimating costs in sufficient detail to support the remedy-selection process. It is not meant to be used solely to develop detailed design or operating parameters that are more appropriately developed during the remedial design phase. Bench-scale or pilot-scale techniques may be utilized, but in general, treatability studies will include the following steps:

*preparing a work plan (or modifying the existing work plan) for the bench or pilot studies;

*performing field sampling, and/or bench testing, and/or pilot testing;

*evaluating data from field studies, and/or bench testing, and/or pilot testing;

*preparing a brief report documenting the results of the testing.

Chapter 6 of U.S. EPA's draft Guidance for Conducting RI/FSs Under CERCLA (March 1988) provides information regarding this Task.
A technical memorandum will be prepared and submitted to the U.S. EPA detailing Task 8.

TASK 9 - REMEDIAL ALTERNATIVES EVALUATION

Section 121 (b)(1)(A-G) of CERCLA outlines general rules for cleanup actions, and establishes the SARA statutory preference for permanent remedies, and for treatment and/or resource recovery technologies that reduce toxicity, mobility or volume of hazardous substances, pollutants and contaminants. Further, it directs that the long-term effectiveness of alternatives be specifically addressed and that at a minimum the following be considered in assessing alternatives:

A. Long-term uncertainties associated with land disposal;

B. Goals, objectives and requirements of the Solid Waste Disposal Act;

C. Persistence, toxicity, mobility and propensity to bioaccumulate of hazardous substances and their constituents;

D. Short and long-term potential for adverse health effects from human exposure;

E. Long-term maintenance costs;

F. Potential for future remedial actions costs if the alternative were to fail; and

G. Potential threat to human health and the environment associated with excavation, transportation and redisposal, or containment.

The U.S. EPA has developed nine evaluation criteria. Consideration of the criteria is intended to satisfy the statutory requirements; i.e., points A through G above, and to enable the decision maker to compare alternatives and select a remedy which will:

1. Be protective of human health and the environment,

2. Attain applicable or relevant and appropriate requirements (ARARS), or provide grounds for invoking a waiver,

3. Be cost effective,

4. Use permanent solutions and alternative treatment technologies to the maximum extent practicable, and

5. Satisfy the preference for treatment that reduces toxicity, mobility or volume as a principle element (or provide an explanation for why it does not).

The Evaluation of Alternatives task is basically a three-stage process consisting of the following:

*Detailed development of alternatives,
*Detailed analysis of alternatives, and
*Comparison of alternatives.

Subtask 9A - Detailed Development of Alternatives

Each alternative will be defined in sufficient detail to facilitate subsequent evaluation and comparison. Typically this activity may involve modification of alternatives based on ARARS, refinement of quantity estimates, technology changes, or site areas to be addressed. Prior to detailed definition, the final list of conceptual alternatives will be agreed upon by U.S. EPA and Weston.

Subtask 9B - Detailed Analysis of Alternatives

Alternatives will be evaluated with respect to nine criteria. See Table 6. The nine criteria encompass:

*technical, cost and institutional considerations;
*compliance with statutory and regulatory requirements; and
*state and community acceptance.

Each factor is discussed below:

*Short-term effectiveness: The assessment against this criterion examines the effectiveness of alternatives in protecting human health and the environment during the construction and implementation period until response objectives have been met.

*Long-term effectiveness and permanence: The assessment of alternatives against this criterion evaluates the long-term effectiveness of alternatives in protecting human health and the environment after response objectives have been met.

*Reduction of toxicity, mobility and volume: The assessment against this criterion evaluates the anticipated performance of the specific treatment technologies.

*Implementability: This assessment evaluates the technical and administrative feasibility of alternatives and the availability of required resources.

*Cost: This assessment evaluates the capital and O&M costs of each alternative.

*Compliance with ARARS: This assessment against this criterion describes how the alternative complies with ARARS, or if a waiver is required, how it is justified.

*Overall protection of human health and the environment: The assessment against this criterion describes how the alternative as a whole achieves and will continue to protect human health and the environment.

*State acceptance: This assessment reflects the state's (or supporting agency's) apparent preference or concerns about alternatives.

*Community acceptance: This assessment reflects the community's apparent preferences or concerns about alternatives.

Subtask 9C - Comparison of Alternatives

After each alternative has been individually assessed against each of the nine criteria, a comparative analysis will be conducted. The purpose of this analysis is to compare the relative performance of each alternative with respect to each specific evaluation criterion. The narrative discussion will describe the strengths and weaknesses of the alternatives relative to one another with respect to each criterion, and how reasonable variations of key uncertainties could change the expectations of their relative performance. If innovative technologies are being considered, their potential advantages in cost or performance and the degree of uncertainty in their expected performance (as compared with more demonstrated technologies) will also be discussed. A summary table should be prepared highlighting the assessment of each alternative with respect to each of the nine criteria.

TASK 10 - FEASIBILITY STUDY REPORT

Technical Memoranda

The results of specific feasibility study activities will be submitted to the U.S. EPA throughout the RI/FS process. These memoranda will be submitted in draft form for review and comment. Upon receipt of comments, a final form of these memoranda will be prepared and submitted. The specific technical memoranda and their associated schedule will be identified in the Work Plan, and will include:

* Development and initial screening of remedial alternatives;

* Alternatives Array Document.

Feasibility Study Report

A Feasibility Study report covering the activities performed and conclusions drawn from Tasks 4, 6, 7, 8, and 9 will be completed following the approval of the technical memoranda. A draft report will be submitted to U.S. EPA for review and comment. A meeting will be scheduled to discuss U.S. EPA and MDNR comments, if any, prior to preparation of the final draft report by Weston. The FS report will not be considered "draft final" until a letter of approval is issued by the U.S. EPA RPM. The approved draft final FS report will be placed by the U.S. EPA in public repositories for public review and comment. Technical memoranda prepared previously will be summarized and referenced in order to limit the size of the report. However, the report will completely document the FS.

Following the public comment period, should it be determined (by U.S. EPA) that, based on the public's comments, the RI/FS requires revision, the contractor will prepare and submit to U.S. EPA and IDEM such a revision, or, the U.S. EPA may prepare the revision itself.